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seven crystals, from almost every known locality in which this mineral is found. These results are embraced under fifteen heads. Under one of these he states that the electrical activity is greater in the green, brown, and red crystals than it is in black or colorless ones; and that the black crystals often show no electrical phenomena, but, on the other hand, are conductors of electricity. ——The same subject has been treated in a paper by E. Riecke in the *Annalen der Physik und Chemie.*[1]——In his study of Brazilian topaz K. Mack[2] has found that the electrical axis does not correspond to any crystallographic axis, and that in cases where the crystallographic axis does not exactly bisect the optical angle, this anomaly is accompanied by abnormal extinctions in the plane of the optical axes.

BOTANY.[3]

The Study of Plant Diseases.—Although the fungi themselves have been studied in this country for many years, the diseases they produce have hitherto received little attention. One would have supposed that from the thirty or forty agricultural colleges and agricultural departments of colleges in the United States something might have come, but the returns from these institutions have been as meagre as from other sources. Doubtless one great reason for this barrenness of results has been the want of time on the part of the professors of botany. With the burden of many classes always upon them, and often the almost total absence of collections, books, and instruments, the professor of "science" has had indeed a hard road, and it is a cruelty to blame him for not being productive. But with these allowances, it must be confessed that botany is often taught by men almost wholly unacquainted with the subject. It is by no means an unusual thing to find professors teaching botany whose knowledge of the subject stops short of the ability to handle the Compositæ. The Grasses and Sedges, to them, are little better than "Cryptogams," and as to the latter, they are simply Cryptogams. From such botanists no study of plant diseases need be expected.

Two recent publications ought to direct the attention of our botanists to this much-neglected field. Mr. Arthur's report, as botanist of the Agricultural Experiment Station at Geneva, N. Y., shows where and how good work may be done by those competent to do it. Among the topics taken up are Pear Blight, Rotting of Tomatoes, Mildew of Strawberries, Plum-leaf Fungus. Aside from its economic value, the report is valuable as indicating better methods of work in botany. Let any one read over the pages treating of the Pear Blight, and he cannot help feeling that the work there recorded is of a much higher order than that

[1] No. 5, 1886, p. 43. [2] Annalen der Physik und Chemie, No. 6, 1886, p. 153.
[3] Edited by Prof. CHARLES E. BESSEY, Lincoln, Nebraska.

usually considered as belonging to the botanist. The work here recorded is entitled to be called strictly scientific.

The second publication is Mr. F. L. Scribner's "Fungus Diseases of the Grapevine," issued by the Department of Agriculture at Washington, D. C. Its principal contents are the Downy Mildew (*Peronospora viticola*), Powdery Mildew (*Uncinula spiralis*), Black Rot (*Physalospora bidwillii*), Anthracnose (*Sphaceloma ampelineum*), Grape-leaf Blight (*Cercospora viticola*), Grape-leaf Spot (*Phyllosticta labruscæ*). Some good plates accompany the text, and add much to its value. As with the preceding report, this one ought to show our younger botanists that there is an opportunity for them to do good work in botany even.—*Charles E. Bessey.*

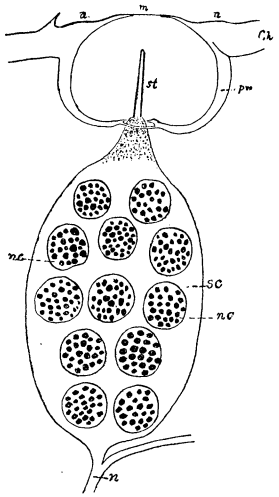
Vegetable Pathology.—Agriculture demands of botany a knowledge of the pathology of vegetation. It is not enough that the normal action of all parts of the plant should be understood; the abnormal and diseased actions must also be considered. Unfortunately, the world is full of accidents, of noisome gases, of poisonous liquids, of freezing or scorching temperatures, of harmful insects, and of destructive fungi. The plant which is more or less affected by one or all of these is not the normal plant of the vegetable physiologist. The vegetable pathologist must build his science upon that of his fellow-worker in vegetable physiology, and the results of the labor of both must be laid before modern agriculture for its use. That botany which hopes to satisfy the demands of the advanced agriculture of to-day must include a knowledge of pathology.—*Proc. Soc. for Promotion Agr'l Sci.*

Botanical News.—From Dr. A. N. Berlese we have a paper on a new Pyrenomycetous genus, Protoventuria, represented by a single species, *P. rosæ* Berl. (= *Venturia rosæ* De Notaris). A good plate accompanies the paper.——The old genus Phoma has been divided, and a new genus, Macrophoma, has been erected by Doctors Berlese and Voglino (*Atti della Societa Veneto-Trentina di Scienze Naturali*, vol. x.). The new genus also includes species formerly referred to Sphæropsis and Sphæronema. Ninety-nine species are enumerated, twenty-one of which are figured upon the accompanying plates.——Doctors Berlese and Voglino have published a volume of Additamenta to Volumes I. to IV. of Saccardo's "Sylloge Fungorum." It includes nineteen hundred and thirty-seven species. These additions to the Sylloge bring up the number of species to the following, viz.: Pyrenomyceteæ, 7564; Sphæropsideæ, 4078; Melanconieæ, 606; Hyphomyceteæ, 3664; making a grand total of 15,912 species. ——A recent paper on Certain Cultures of Gymnosporangium, with notes on their Rœsteliæ, presented by Roland Thaxter to

the American Academy of Arts and Sciences, contains much of interest to the mycologist. As a result of these cultures the author of the paper concludes to connect the species of Gymnosporangium and Rœstelia as follows: *G. conicum*, with *R. cornuta; G. claviceps*, with *R. aurantiaca; G. clavariæforme*, with *R. lacerata; G. macropus*, with *R. pyrata; G. biseptatum*, with *R. botryapites; G. ellisii*, with *R. transformans*, probably. The Rœstelia of *G. globosum* is still left in doubt.——H. N. Patterson, of Oquawka, Ill., has brought out a handy check-list of North American Plants, including Mexican species which approach the United States boundary. It will prove very serviceable.—— Cooke's "British Desmids" has reached the seventh number, and continues to maintain its high character. When completed it will form an excellent companion volume to Wolle's "Desmids of the United States."——Part III. of Macoun's "Catalogue of Canadian Plants" is devoted to the Apetalæ, including the Coniferæ. About one hundred pages are devoted to additions and corrections to Parts I. and II., while a very full index completes the volume. The publication is creditable to the Geological and Natural History Survey of Canada. It is to be hoped that the work will be continued.——The Eriogonous genus Lastarriæa Remy, has lately been studied by Dr. Parry, who confirms its generic rank. Three species are characterized, viz.: *L. chilensis* Remy of the Pacific Coast of North and South America; *L. stricta* Philippi, ined., from Chili; *L. linearis* Philippi, ined., Chili.——An interesting paper, by Thomas Meehan, on the Fertilization of *Cassia marilandica*, received some time ago, has been noticed before in these pages. The author found that not a single seed was produced when the flower was protected from the visits of insects.——Dr. Beal's "Lessons on Growing Forest Trees," in a late Bulletin of the Agricultural College of Michigan, possesses botanical as well as horticultural interest. ——Dr. Gray's Botanical Contributions (Proc. Am. Acad. Arts and Sciences, vol. xxi. pp. 363 to 413) includes besides a much needed revision of the North American Ranunculi, descriptions of plants from Northern Mexico, mainly from the collections made by C. C. Pringle and Dr. Edward Palmer. In referring to the need of a revision of the Ranunculi, the statement is made that "almost half a century ago the North American species of Ranunculus, as then known, were hastily compiled for Torrey and Gray's Flora, with very little knowledge of original materials; and they have not been elaborated since."——Numbers 146 and 147 of the *Journal of the Linnean Society* contain papers on the Mosses and Hepaticæ of Central Africa, by Wm. Mitten; Note on Balanophora, by Henry Trimen; a report on the Vegetation of Diego Garcia, by W. B. Hemsley, and the Forms of Seedlings, by Sir John Lubbock. The last will be noticed more fully in these pages hereafter.——The *Gardeners' Chronicle*

PLATE XIII.

1.



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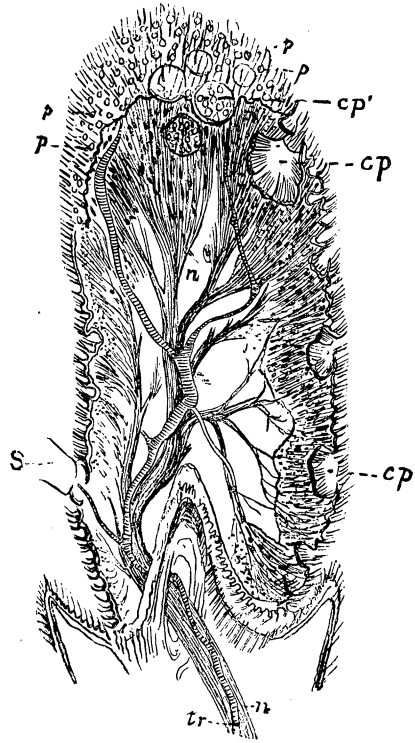

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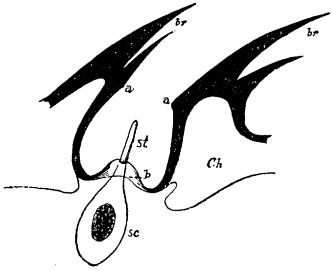

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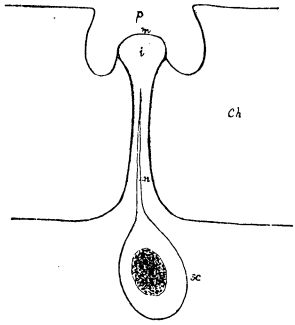

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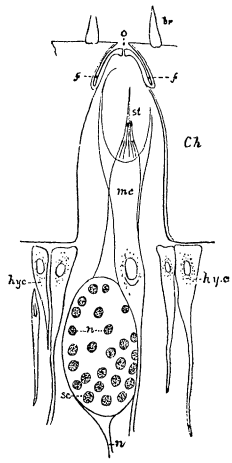

ORGANS OF SMELL IN INSECTS.

(London) has been reduced in price, now costing American subscribers about $4.60. The pages have been reduced slightly in size, and some changes have been made in the type and heading. This valuable journal (to botanists as well as to horticulturists) now enters upon its third series.

ENTOMOLOGY.

Hauser on the Organs of Smell in Insects.[1]—Although Hauser's researches have been published in Germany several years, they were so carefully made and conclusive that our readers will, we feel sure, be glad to have laid before them in detail the facts which prove so satisfactorily that the antennæ of most insects are olfactory rather than auditory in their functions. Kraepelin in 1883 confirmed Hauser's views, and recently Will has published an excellent paper on the organs of taste in insects, especially wasps, etc., so that our knowledge of the senses of Arthropoda has been greatly extended and cleared up within the last few years. It now appears that few insects are known to have genuine ears, those of the locusts and grasshoppers being alone proved to be auditory organs. It appears that most insects (the sound-producing ones excepted) are probably deaf, while nearly all have very acute senses of smell, taste, and touch.

That many insects possess an unusually acute sense of smell no naturalist disputes. A point in debate, however, is the site of the organ of smell in these animals. The author attempts to settle the question.

I. *Physiological Experiments.*—First of all one should observe as exactly as possible the normal animal in its relation to certain smelling substances, whose fumes possess no corrosive power or peculiarities interfering with respiration; then remove the antennæ and try after several days to ascertain what changes have taken place in the relation of the animal to the substance. In order to come to no false results it is often necessary to let the animals operated upon rest one or two days, for immediately after the operation they are generally so restless that a careful experiment is impossible.

The extirpation of the antennæ is borne by different insects in different ways; many bear it very easily, and can live for months after the operation, while others die in the course of a few days after the loss of these appendages. The animals seem to be least injured if the operation is performed at a time when they are hibernating. *Pyrrhocoris apterus* L., and many other insects, afforded a very striking proof of this relation.

Experiments made by placing the antennæ in liquid paraffine so as to cover them with a layer of paraffine, thus excluding the air, gave the same result as if the antennæ had been removed.

[1] Zeitschrift für Wissenschaft. Zoologie, xxxiv., 1880. Three plates.